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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/347,583	06/30/1999	TUQIANG NI	LAM1P111/P05	4070

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BEYER WEAVER & THOMAS LLP
P.O. BOX 778
BERKELEY, CA 94704-0778

EXAMINER
DEO, DUY VU NGUYEN

ART UNIT	PAPER NUMBER
1765	

DATE MAILED: 03/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Offic Action Summary	Application No. 09/347,583	Applicant(s) NI ET AL.	
	Examiner DuyVu n Deo	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 October 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13,23 and 24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13, 23, 24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-13, 23, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishida et al. (US 5,213,658) in view of Hills et al. (EP 0676790 A1).

Ishida teaches a plasma processing method and a plasma processing apparatus. A substrate to be processed is placed on a high frequency electrode. This reads on the applicant's limitation of a chuck for supporting a wafer. A laminated film to be etched and a resist pattern are formed on the substrate. Focus rings surround the sides of the wafer forming a barrier (figure 1A). Permanent magnets are embedded in the focus rings. At this time, the amount of electric current flowing through the electromagnets is set so that the height of the focus ring is suitable for obtaining the best uniformity when the uppermost layer of the laminated film formed on the substrate is etched (col. 3, lines 22-35). A reactive gas is introduced into the chamber containing CF4, CHF3, Cl2, or HCl. The uppermost film is etched. This reads on the applicant's limitation of a barrier having a first position relative to the wafer wherein the first position facilitates etch uniformity for a chemically driven etch process. Then, the second layer is etched. The focus rings is floated to a position suitable for obtaining the best etching uniformity for the material of the second layer. This reads on the applicant's limitation of a movable barrier. The reactive gas is introduced into the processing chamber and the high-frequency power is applied between the

electrodes so that plasma of the reactive is generated. Uniform etching performed for each layer. In order to obtain optimal etching conditions, the height of the focus ring may be adjusted during the etching operation (col. 4, line 1-9). This reads on claimed limitation of a barrier having a second position that does not interfere with etch uniformity of an ion driven etch process.

Unlike claimed invention, Ishida does not require that the focus ring have a first position that is capable of restricting diffusion of gases over the wafer within the plasma processing apparatus to the wafer. Hills discloses a focus ring for semiconductor wafer processing in a plasma reactor. The focus ring protects the wafer periphery from gases or plasma which otherwise have a faster flow rate near the wafer periphery (col. 1, lines 1-6). Therefore, the focus ring acts as a diffusion barrier. The focus ring reduces the non-uniformity of the wafer etch rate which is caused by non-uniform plasma distribution across the wafer. The focus ring is supported by a lift mechanism that can move the focus ring. It would have been obvious at the time of the invention for one skilled in the are to modify Ishida by using the focus rings as diffusion barriers as taught by Hills. The method of using focus rings as diffusion barriers would have been anticipated in order to avoid non-uniform processing of the substrate.

Referring to claim 8, as described above, Hills teaches the focus rings can be used as a diffusion barrier. Ishida teaches that in order to obtain optimal etching conditions, the height of the focus ring may be adjusted during the etching operation (col. 4, line 1-9). Therefore, it would have been obvious to one skilled in the art that the focus rings' position would affect the diffusion of the ions in the plasma and the amount of controlling would be depending on their position relative to the substrate and so the focus rings is capable of having a second position that

does not substantially prevent the diffusion of gases over the wafer within the plasma processing apparatus.

Referring to new claims 23 and 24, since the focus rings are movable, they would be capable of being recessed or situated below the wafer and since the focus barrier can be used as diffusion barrier, the diffusion barrier would be considered to be such that it is within the focus rings and flushed with an upper surface of the focus rings in the second position.

Claim Objections

3. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claims 14, 15 have been renumbered as 23, 24.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 23 and 24 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant has not shown where in the specification teaching of the barrier is recessed so as to not disturb an ion-assisted etch process and the barrier

is situated below the wafer and within a focus ring such that the barrier is either flush with or below an upper surface of the focus ring in the second position.

Response to Arguments

6. Applicant's arguments filed 10/21/02 have been fully considered but they are not persuasive.

Referring to applicant's argument that it is improper to combine the reference because Hills teaches against moveable focus rings while Ishida focuses on moveable focus rings is found unpersuasive because while this may be the case; however, applicant's has not traverse the rejection that the focus rings can be used as diffusion barriers in order to avoid non-uniform processing of the substrate. Also this is the motivation for combining of the reference that has not been traversed by the applicant.

Referring to applicant's argument that Ishida doesn't teach the second position does not interfere with the etch uniformity of the ion driven etch process; please see col. 2, lines 35-38; col. 4, line 29-31 where he teaches changing position to obtain optimum etching conditions and the plasma etching process uniformly etch the layers. This would provide the second position that has an uniform etching (claimed does not interfere with the etch uniformity of the ion driven etch process).

Referring to claim 8, as described above, Hills teaches the focus rings can be used as a diffusion barrier. Ishida teaches that in order to obtain optimal etching conditions, the height of the focus ring may be adjusted during the etching operation (col. 4, line 1-9). Therefore, it would have been obvious to one skilled in the art that the focus rings' position would affect the diffusion of the ions in the plasma and the amount of controlling would be depending on their

position relative to the substrate and so the focus rings is capable of having a second position that does not substantially prevent the diffusion of gases over the wafer within the plasma processing apparatus.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD
March 18, 2003

BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700